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Reducing evaporation losses from farm dams

Rainfalls in southern Australia are declining and at the same time evaporation rates are increasing due to the warming climate. So while the quantity of water that is getting into dams, reservoirs and rivers is decreasing, the evaporation losses from those storages are increasing and the water demand of irrigated plants is also increasing. The result is that water is becoming steadily harder to get and more precious.

I was losing too much water from [my dams](#) and decided that I had to do something about it. This page was written partly to inform others of the available options and the pros and cons of each, and partly for my own information.

This page was written in 2009. Many, perhaps most, of the anti-evaporation products listed will no longer be available (in 2016). I don't have the time or inclination to update the available products.

Written 2009/03/12, modified 2016/05/24
Contact: email daveclarkecb@yahoo.com

Introduction

The value and [cost of water](#) in southern Australia has increased significantly in the last decade or two. Our governments should be spending serious money on researching evaporation limiting methods, but do not appear to be doing so, just as they are doing next to nothing to limit the cause of the problem – [climate change](#).

What can be done economically to reduce the evaporation losses of the increasingly precious and scarce water in storages across southern Australia? Whatever is done will cost money, but often to get by without water is not an option, we simply must have the water!

In my own dams I loose far more water to evaporation than I use for irrigation. Annual evaporation in the Clare Valley, from a Bureau of Meteorology map on the Net, is between 1600 and 1800mm per year, and the Northern and Yorke Natural Resources Management Board has estimated that evaporative losses from farm dams (2100ML/yr) is greater than the amount of irrigation water that is taken from them. In warmer areas – and most of South Australia is warmer than Clare – the losses would be even worse.

The simple loss of water is not even the whole problem; when the water evaporates any salt – there is always salt in natural water – is left behind; so the salinity of the remaining water increases. The higher the salinity of water, the more problematic is its use.

Reducing evaporation

On a calm day the air close to the surface of the water in a storage becomes saturated with water vapour. So long as the layer of saturated air stays put, there will be little further evaporation, but if there is a wind the saturated air layer will be continually mixing with dry air and evaporation will continue.

Evaporation can be reduced by either providing some sort of a barrier between the water and the air or by somehow slowing the movement of the air near the water surface.

Planting a wind-break of trees and shrubs around the dam will help to some extent.

Things to consider regarding evaporation limiting methods

- How stable will the cover/barrier be in high winds?
- How long will it last?

- Will it be stable when the dam is dry?
- Are there special requirements – at least one product requires 30cm or more of water in the dam at all times?
- Will it leach toxic substances into the water?
- How will it stand up to what is a corrosive environment – continual contact with water and air and some level of salinity; exposure to ultra-violet light that can degrade some plastics?
- Some products are easily and cheaply installed by the land owner, others require expensive installation by specialists.
- What warrantee is there and is the company likely to be around in five years if you need to call on the warrantee?
- Does the product need to cover only the water, or does it need to be large enough to allow for anchoring beyond the lip of your dam – making a big impact on the final price?
- If your dam wall is vegetated, how much damage will be done to this during installation?
- Many of the products on the market are flammable. The probability of a bushfire during the life of the cover must be considerable; in some areas more than others.

Consideration should also be given to what will happen to dust and leaves that will blow onto the devices; what happens to the rain that falls onto them? Some systems require pumping to remove rain water from the cover; increasing costs and labour.

Several of the products use expanded polystyrene which, in my experience, becomes chalky and powdery on the surface after long exposure to sunlight.



Full dams, a sight we don't see so often in recent years. (My dam, the nearer one, filled about two years out of every three in its first ten years, in the next six years it did not fill at all. In the six years since installing [AgFloats](#) it has never been dry.)

Note that the wall of my dam is vegetated. Installation of some evaporation barriers would involve heavy damage to this. The capacity of my dam is about 2.5ML.

Obviously if your dam leaks then an evaporation barrier is not going to change that.

All of the products that seem likely to be acceptable and effective are going to stop you from swimming in your dam.

Air-water contact

My reading on the evaporation barrier subject indicates that if the water contains a significant amount of organic matter (leaves, algae, invertebrates, etc.) there must be significant contact between air and water to avoid the water going bad. If contact with the air and light is cut off the algae and invertebrates will die. They and the leaf litter will then rot and this will quickly use up all the oxygen in the water; substances such as methane and hydrogen sulphide (rotten egg gas) are produced by bacteria that live in anoxic conditions, and quite probably the water will become acidic.

This problem can be avoided if most of the organic matter is removed from the water before it goes into the sealed storage.

Some thoughts on costs

Evaporation reduction does not come cheap; either you pay for ready-made fixes in money or you pay for home-made fixes with less money but a lot of your time. The costs of the individual products can be found in [another section](#) of this page.

A rough calculation: my case –

Average annual evaporation in my area (Clare, SA) is about 2m. In [my dam](#) this represents something like a megalitre of water (it depends very much on how much water is in the dam at the start of the evaporation season). If the cure I use reduces the evaporation by 80%, costs \$7000 and lasts twelve years this is $800\text{kL} \times 12 = 9.6\text{ML}$; \$7000 for 9.6ML is \$0.73/kL.

This might be compared with using a big covered tank. I priced a 250kL tank at \$15 000. Assuming a life of 15 years we have $250\text{kL} \times 15 = 3.75\text{ML}$; \$15 000 for 3.75ML is \$4/kL.

Also the evaporation barrier will make up to 2ML available to me while the tank would only have given me an eighth as much. I will leave it to the accountants to calculate money costs, depreciation, etc.

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Climate change in the Clare Valley

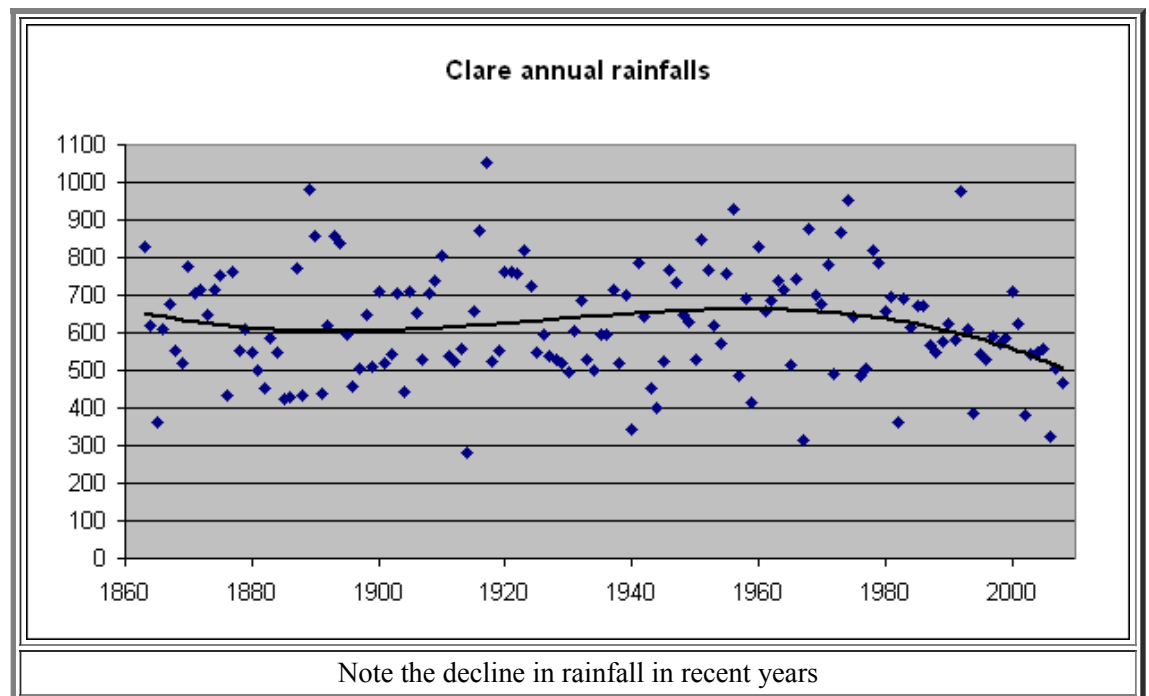
[My dam](#) is in the Clare Valley of South Australia. The climate is changing in the Valley; rainfalls are decreasing and temperatures are increasing; consequently runoff is decreasing and evaporation (and evapotranspiration) is increasing. This would apply to most of the southern half of Australia.

Clare rainfall

The graph at the right is made up of Bureau of Meteorology data taken from Clare Post office (1863 to 1994) and Clare High School (from 1995 onward).

The average annual rainfall from 1863 to 1990 was 632mm, from 1991 to 2008 it was 557mm, 75mm lower. In the period from 1994 to 2008 the average was 525mm, 107mm lower than the 1863 to 1990 average. The curved line was calculated as a line of best fit to the data.

The steepness and persistence of the decline in rainfalls since about 1970 seems to be unprecedented in the data. Plainly the declining rainfalls, combined with higher



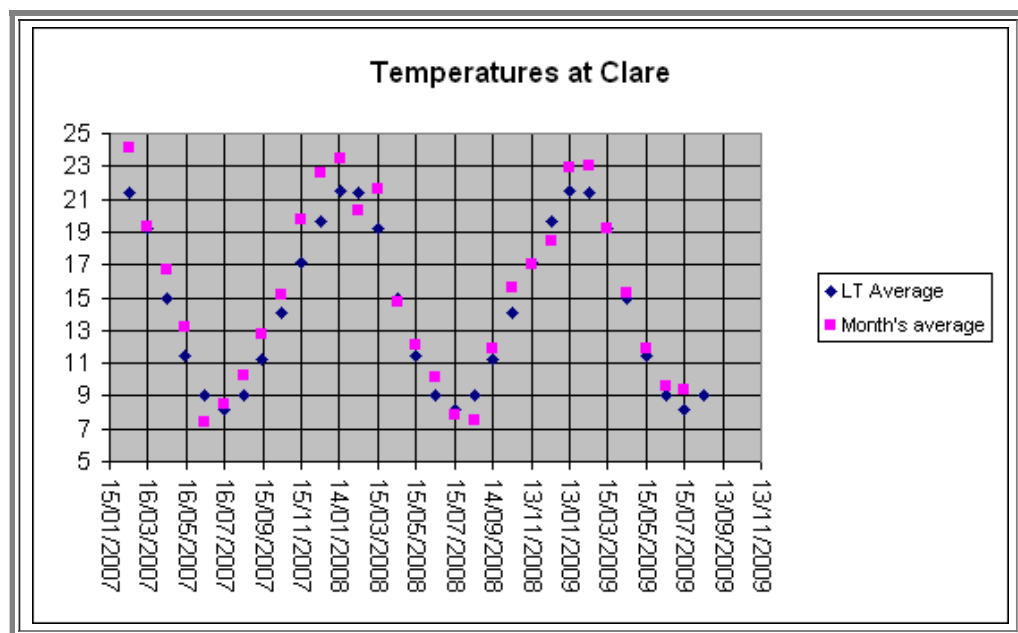
temperatures, will stress perennial plants.

Worryingly, the decline in rainfall seems to be becoming steeper, there is no reason to think that the bottom has been reached.

Clare temperatures

In the graph at the right the blue diamonds are long-term average monthly temperatures for Clare. Pink squares are averages of the temperatures measured in particular months.

Note that in most cases the temperatures (and in particular those of the spring and summer of 2007/08) were higher than those for average months (pink plots are above blue plots) – evidence that the climate is warming in the Clare Valley. On average the temperatures during the whole of the period shown on the graph were 0.79° warmer than the long-term average.



These data are extracted from Bureau of Meteorology records available on the Net.

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The products

Below I have listed the evaporation reduction methods that I have found and included comments that I believe to be relevant to evaluating them. It seems that a number that have been promoted are not now available (September 2009). In the case of Aquatrain, I have included details of tests that I did on its efficacy.

For the solid barriers and covers I have excluded at least some products that were more expensive than about \$15 per square metre: I can't afford to pay that much (except if I was sure that such a product would last, say, twenty years or more, and none of these products have been available for anything like that length of time).

The products are listed in alphabetical order.

Note

This page was written in 2009. Many, perhaps most, of the anti-evaporation products listed will no longer be available (in 2016). I don't have the time or inclination to update the available products.

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AgFloats

A system that uses recycled tires as an evaporation barrier, with polystyrene to make the tires float, has been commercialised in South Australia under the name [AgFloats](#). AgFloats is a product of Reclaim. (An earlier version of AgFloats used recycled polystyrene, but a newer process [September 2009] uses new; with the hope of being able to use half recycled and half new at some time in the future.)

The business is based at 93 Frome St., Adelaide (phone 08 8232 3388), and has another site at 20 Evans St., Woodside, (SA, phone 08 8389 9544) The person to talk to is John Crosby.



AgFloats (Mark 1) recycled tires on a community dam at Blyth, SA
Photo credit Northern Argus

To my knowledge, the system has been used on at least one station (NW of Kimba in South Australia). The manager of that station told me that it had resulted in an 80% reduction in evaporation.

As I write in July 2009, AgFloats are converting from a system based on truck tires (Mark 1) to one based on car tires (Mark 2). The latter have the advantage to the land-holder of being lighter and easier to move, if that is necessary; Mr Crosby claims that the new system will provide even greater evaporation reduction.

A disadvantage to the new system, in my mind, is that the polystyrene is exposed to sunlight and will gradually degrade – although the tires will provide some protection from the UV light. Also, since the new system uses new polystyrene it is less environmentally-friendly than the old system which used recycled.

Cost

As of July 2009, I believe the price of these has not been decided, because of the conversion in the process, but I am lead to believe that they should cost about \$10 per square metre; about \$7000 for my approximately 700m² dam.

My thoughts

This product seems to me to be the front runner in evaporation reduction methods for farm dams (as of mid-2010). Its price is much lower than [Aquacap](#) and I like the fact that it is using recycled tires that would otherwise go to land fill. The tires should protect the polystyrene from degradation by ultraviolet light. I bought AgFloats [for my dam](#).

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AquaGuard

A quick Net search suggested to me that this product may still be available for swimming pool covers, but not for dam covers.

Aquatain

Aquatain is a silicone based liquid that is spread in a very thin layer on top of bodies of water to form a barrier stopping contact between water and air and reducing the amount of loss to evaporation. The maker, Guyco, claims Aquatain will reduce evaporation by more than 50%.

An Internet search that I conducted didn't show any independent research that had been done on the effectiveness of Aquatain. Aquatain has a site on the [Net](#).

I emailed Aquatain (info@aquatain.com.au) on 2009/03/02 inquiring about whether any independent report of the product's effectiveness was available. I received a reply from Peter Leach, (a/the) director of Aquatain the following day. Total Ag Services Pty, Ltd of Dalby, Qld. had done an evaluation in April 2007. Peter Leach forwarded me a copy of this. The trial was carried out over a three-week period and the gist of the report was that the evaporation was reduced by about 50% during this period.

Mr Leach also forwarded a water test report which suggested that the water quality was not adversely effected by Aquatain.

As I had bought 2½L of Aquatain I decided to do my own testing. My trial involves comparing the changes in water level in a dam (treated with Aquatain) with the changes in water level in a 20L drum, open at the top. My trial setup was very simple. Note that seepage could affect the results of this trial, see [note below](#).

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First evap. gauge setup
Dam and tub



First evap. gauge setup. Tub with its gauge, gauge in dam (there is a wooden ruler nailed to the stake)



Second evap. gauge setup. Tub buried to reduce solar heating;

the clamp holds a ruler marked in millimetres



Second evap. gauge setup
Tub and dam



Second evap. gauge setup
Gauge in dam

Aquatain trial record					
2009/02/28	First evap. gauge setup				
Date	Dam loss (mm)	Tub loss (mm)	Saving (mm)	Saving (%)	Notes
2009/02/28	-	-	-	-	Aquatain added
2009/03/06	-	-	-	-	Water level gauges installed
2009/03/07	7	6	-1	-17%	-
2009/03/08	-	-	-	-	More Aquatain added
2009/03/10	12	19	7	37%	-
2009/03/12	12	12	0	0%	-
Total, 1st trial	31	37	6	16%	End first trial
2009/03/12	Second evap. gauge setup				

Date	Dam loss (mm)	Tub loss (mm)	Saving (mm)	Saving (%)	Notes
2009/03/15	21	19	-2	-11%	More Aquatain added
2009/03/24	49	41	-8	-20%	More Aquatain added
2009/03/29	10	15	5	33%	
2009/04/02	27	27	0	0%	
Total, 2nd trial	114	109	-5	-5%	Second trial
Total	145	146	1	1%	First and second trial

A flaw in my first trial setup was that the tub would be likely to get quite hot in the sun and then the amount of evaporation from it would increase due to this heating. By setting the tub in the ground this disproportionate solar heating should be avoided.

Conclusion

My trial indicated that Aquatain, at least in this particular setting, is of no value. There is a suggestion in the data that the layer disappears after only a day or two.

Could it be that Aquatain is adsorbed onto the clay particles around the edge of [my dam](#)? Clay very effectively adsorbs many substances. Perhaps Aquatain would work where it does not come into contact with clay, for example, in the case of a plastic-lined dam?

Aquatain has been on the market for several years, it is readily available; it was held in stock at my local irrigation supply store. Many people must have tried it. It is disappointing that no-one else had taken the little trouble needed to investigate whether the stuff worked and put their results on the Net.

Seepage

The above calculations do not take into account the possibility of seepage. Measurements that I did in June and July of 2009 indicated that seepage in my dam is negligible.

Aquacap

This product is by Nylex/Rio Tinto who have a Net page on the product at <http://www.aquacap.com.au>. It is claimed that Aquacap reduces evaporation by 85%.

The product is a circular floating disc made of polypropylene, 1.15m in diameter, 200mm high and weighing 3kg each. They are claimed to have been tested to wind speeds of 130kph. Lifespan is claimed to be five years plus.

Other benefits claimed:

- UV and wind proof;
- Allows rain water to enter the storage facility;
- Preserves water quality;
- Easy to transport;
- Wind, hail and debris resistant.

Telephone 0438 309 530

Cost

I phoned and asked for an approximate price for [my dam](#), which is about 700m² in area. I was told I'd need about 600 discs at a price of \$23.50 each plus GST, a total of about \$15 500 (\$26 per square metre); much more expensive than [AgFloats](#).

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The Nyllex Aquacap

Aquacap
Image from Nyllex

CURV

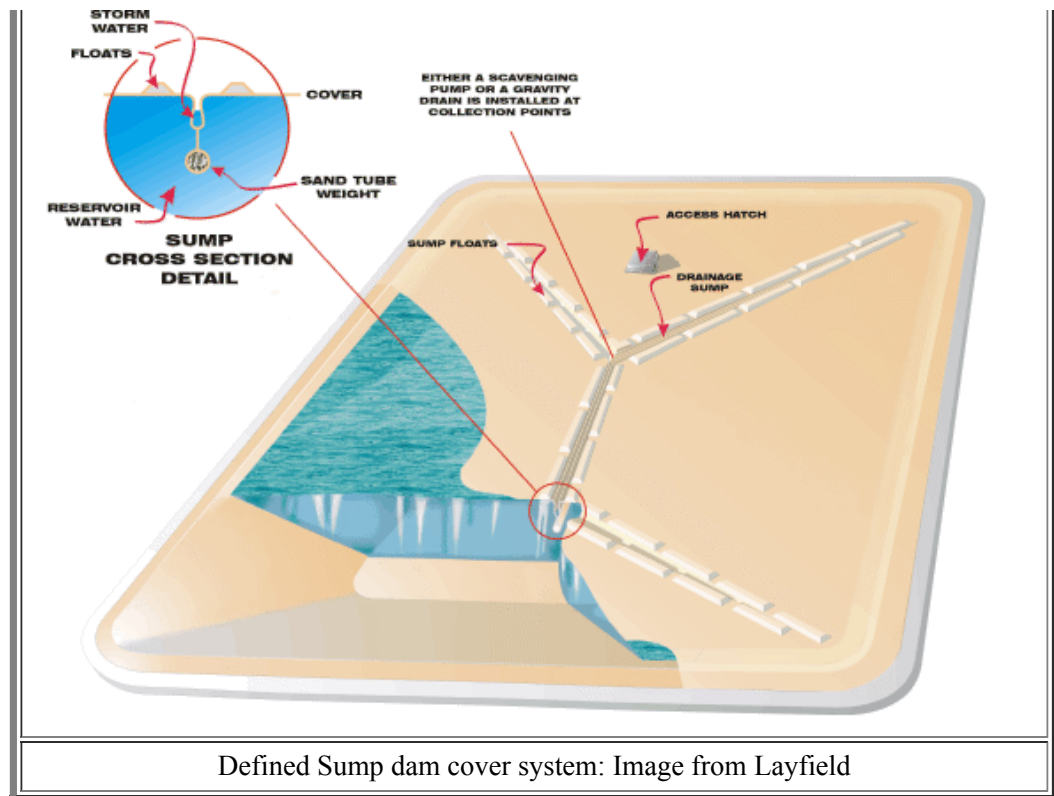
Mentioned in the [DKCRC, WaterSmart paper](#), apparently not commercially available yet. No URL or supplier details known.

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Defined Sump

Made by





Defined Sump dam cover system: Image from Layfield

Layfield/C. W. Neal, this and [Revoc](#) have a [page](#) on the Net. Layfield's blurb:

"Defined sump floating reservoir covers use a combination of attached closed cell foam floats and sand tube ballasts. These elements are used to create drainage sumps that collect and carry storm water to either scavenging pumps or gravity drains for water removal into a drainage system. The floating cover itself is typically fabricated of reinforced Hypalon or polypropylene geomembranes. Floats and ballasts are encapsulated in geomembrane as well for maximum longevity. Our new lightweight evaporation control covers and algae control covers are produced from unsupported Enviro Liner 6030. Enviro Liner 6030 is a highly durable cover material which offers excellent long term weathering capabilities and is NSF 61 certified for potable water applications."

My thoughts

I suspect that installation would cause serious damage of the native vegetation on [my dam](#) wall. The [Desert Knowledge CRC paper](#) gives an estimated cost (Dec. 2004) of \$30/2m, which is too expensive for me. I have no need to keep water and run-off out of my dam – quite the contrary.

Enviro Dam Cover

The [Net page](#) is not very informative. It states several times that the product is a "Twin Plastic Board cover", but does not state what the plastic is, nor any detail about construction. It goes on to state; "Maintaining healthy water quality: Our solution hampers bacterial growth by allowing natural UV light to filter through and kill bacteria. This helps maintain the water in a good condition." This sounds highly questionable to me; bacteria are a very natural part of any ecosystem, and while they are killed by ultra violet light, this would only happen in the upper levels of any murky dam.

The Net page states that the cover is guaranteed for three years against damage by UV light. This seems to me to be inadequate; what about damage from wind and other causes (such as animal feet)? In any case a dam cover should have a life much greater than three years.

Cost

The Net page states that the cost is \$8 per square metre, and installation is done by the land-owner. The product comes in 3mm or 5mm thickness "depending on the desired application and strength"; presumably the \$8 price applies to the 3mm thickness.

Contact

New Fast Link Pty Ltd
Trading as Dam Covers Now
31 Cheam St, Dandenong North, VIC 3175
Ph: +61 3 9774 8303 | Fax: +61 3 9774 7336 | info@afb.com.au

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E-Vap Cap (or Evap-Cap)

E-Vap Cap is a floating polyethylene sheet cover; there is a [Net page](#). The Net page states:

"The floating cover consists of a unique, multi-layered, polyethylene membrane 540 microns in thickness that contains its own buoyancy cells. It carries a 5-year pro-rata warranty against UV breakdown due to sunlight exposure (independent NATA laboratory testing indicates a much longer "life" expectancy than 10 years). Optional thicker material, up to 1000 microns is available giving greater warranty and a design life of 20 years."



Evap-Cap: Image from [Bartlett](#)

An inquiry requesting price and installation requirements, 2009/08/18, resulted in a quick response including a pdf file on E-vapcap and other products by the same company. This pdf file stated, among other things, that "The covers feature a conditional ten year warranty, however, testing indicates a much greater lifespan"; which is true, five or ten year?

A request for a price resulted in a written quote from Bartlett Water Services. I had given 20m x 30m as the approximate dimensions of the surface of the water in [my dam](#) when full. Bartlett took my dimensions to be those of the dam at the top of the batters, which would actually be considerably larger than my 20x30m. They stated that the "quantity of material required including allowances for top of banks, anchor trenches, welding overlaps etc is approx. 1011.84²" and gave an approximate price of \$10 175 plus freight. As the dimensions of my dam at the top of the batters would probably be at least 25x35m it would seem the adjusted cost would be considerably higher, perhaps \$14 000, plus freight (\$23 per square metre in my case). **Installation was not included in the quote.**

None of the information I have read on E-Vap Cap says anything about whether any significant contact between the air and the water in the dam is maintained. My general reading indicates that [such contact](#) is important.

My thoughts

This product is expensive, especially so as it must be large enough to not only cover the water in the dam but also the anchoring trenches.

[my dam](#) wall is well covered in native vegetation that has become established over a period of 15 years; digging the anchor trenches and refilling them would destroy much of this.

My reading on the evaporation barrier subject indicates that there must be significant contact between air and water if there is to be no risk of the water becoming anoxic, smelly, and deadly to most aquatic organisms. Would this cover provide that contact? What happens to dust, leaves, etc. that blow onto the cover, and rainwater that falls on the cover? How stable would the cover be in strong winds, especially when the water level in the dam is low?

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Evap-Mat

Quoting from [DKCRC, WaterSmart paper](#):

Description:

The cover is comprised of laminated 20 micron, stainless steel mesh and 0.4mm bubble HDPE sheet. The cover is anchored to the storage floor by cables attached to a buried polyethylene pipe. It is designed to only cover 90% of the water surface area.

Manufacturer/Supplier:

Reservoir Covers Australia (Pty Ltd proposed extension).

Performance as stated by the manufacturer:

May reduce evaporation by up to 90 per cent depending on the water level of the storage.

Costs:

\$3.50/m2 for complete installation.

Durability:

Life expectancy of 30 or more years – resistant to UV light and oxidation.

Installation:

Not available.

Advantages:

It is simple and easy to install, heat reflective and self-protecting in high winds (up to 150 kph) whether empty or full. The cover is also suitable for all storage sizes, shapes and profiles up to 2 km wide.

Apparently Evap-Mat is a product of DeVere Mining Technology Limited, who state on their [Evap-Mat](#) Net page that it is "a low cost, long life floating cover for water reservoirs and dams at mining sites". DeVere also state that the project is temporarily on hold (2009/09/17).

My thoughts

The expected life is great, but why then is no warrantee period stated?

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Fabtech

Fabtech have a page on the [Net](#). They claim to have 25 years experience in liquid containment.

I did not find their Net page very informative. I sent an email to



Fabtech dam cover: Image from [Fabtech](#)

admin@fabtech.com.au seeking more information regarding a cover for my dam (2009/09/17).

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HexDome

Quoting from [DKCRC, WaterSmart paper](#):

Description:

An independent modular system made from UV resistant recycled plastic – each module covers one square metre.

Manufacturer/Supplier:

Indusium Pty Ltd and tested by the Queensland University of Technology. Stoph Vanwensveen

Email:

stvn@bigpond.com (apparently no longer valid: DC)

Performance as stated by the manufacturer:

Reduce evaporation by up to 90%

Costs:

The anticipated cost is \$4.50-8.00/m2

Durability:

Expected life of more than 25 years.

Installation:

This cover may be easily installed by the owner.

Advantages:

It has been shown to greatly reduce the effects of wave action, and is easily installed by the customer.

I was unable to find anything on the Net connected with this product (2009/09/17).

My thoughts

If it is easily installed by the owner then there must be no need for earth-works to anchor it. I like the fact that it uses recycled plastic. No warrantee is mentioned.

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Lem Tec Modular Single Sheet Cover System

Mentioned in the [DKCRC, WaterSmart paper](#), apparently not commercially available yet.

Mod-E-Vap

Mentioned in the [DKCRC, WaterSmart paper](#), apparently not commercially available yet.

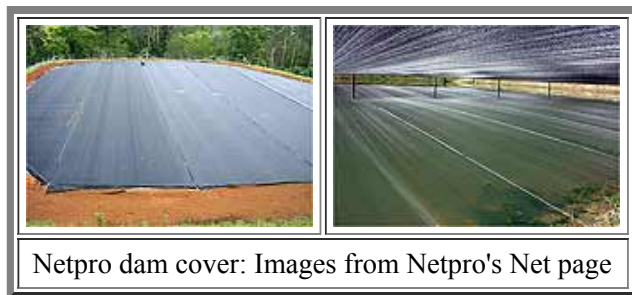
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Netpro suspended cover

[Netpro](#) produce a suspended dam cover. Knitted shadecloth is supported by poles and high-tension steel cable. The support structure lifespan is claimed to be 30 years, and the canopy is expected to last more than 15 years.

My thoughts

The anchoring of the high tension steel cables would require major disturbance of the native vegetation on [my dam](#) wall.



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Polynet

Mentioned in the [DKCRC, WaterSmart paper](#), apparently not commercially available yet.

My thoughts

Polynet is based on polystyrene sheets wrapped in a net. Polystyrene becomes chalky and powdery when exposed to sunlight for long periods.

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QUIT Evap Modular Floating Cover

Quoting from [DKCRC, WaterSmart paper](#):

Description:

Quit Evap is a rectangular modular floating cover, manufactured from 0.5-0.75 mm thick polypropylene sheet with polystyrene floats. The modules are interconnected by Velcro straps. The full scale modules are up to 5 m x 25-30 m.

Manufacturer/Supplier:

SMEC Australia Pty Ltd. (Contact: Peter Chapman)
Address: 1st floor, 105 Denham Street Townsville Qld 4810
Phone: (07) 4771 6119
Fax: (07) 4771 6120
Email: Peter.Chapman@smec.com.au

Performance as stated by the manufacturer:

Can effectively achieve 90-95 per cent coverage of the water surface and reduce evaporation by 85-90 per cent.

Costs:

The estimated cost is around \$6.00-8.00/m² plus transport and installation.

Durability:

The cover has a minimum life span of 5 years with a potential life of 8-10 years – the cover is also UV stabilised.

Installation:

Installation of this product is easy and may be done by the owner.

Advantages:

Lightweight and easy to install.

My thoughts

A life span of five, even eight, years is not long enough.

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Raftex



A Raftex cover on a dam
Image from Raftex

Raftex is a product of F Cubed Australia Pty. Ltd., 23 Millennium Park Drive, Whittlesea, Victoria, Australia, 3757. They can be reached at email fcubed@fcubed.com.au

It is claimed that "Raftex has been comprehensively tested by the University of Southern Queensland for the National Centre for Engineering in Agriculture.

The Raftex units are hexagonal and link together – with sufficient space between units to allow proper aeration of the water and for rainwater to get into the pondage. Each panel weighs 16kg, covers 16m² of water and is made of galvabond steel tubing, polystyrene foam, and polyethylene film. It has a 10 year guarentee.

Apparently a minimum of 30cm of water should be left in the dam at all times to anchor the panels.

My thoughts

The requirement for a minimum of 30cm of water in the dam is a concern; how could one make sure that there is always at least that much water left in the dam – after all, lack of water is the problem that these devices are supposed to solve. And in a small dam that may only be two or three metres deep, 30cm represents a considerable volume of water.

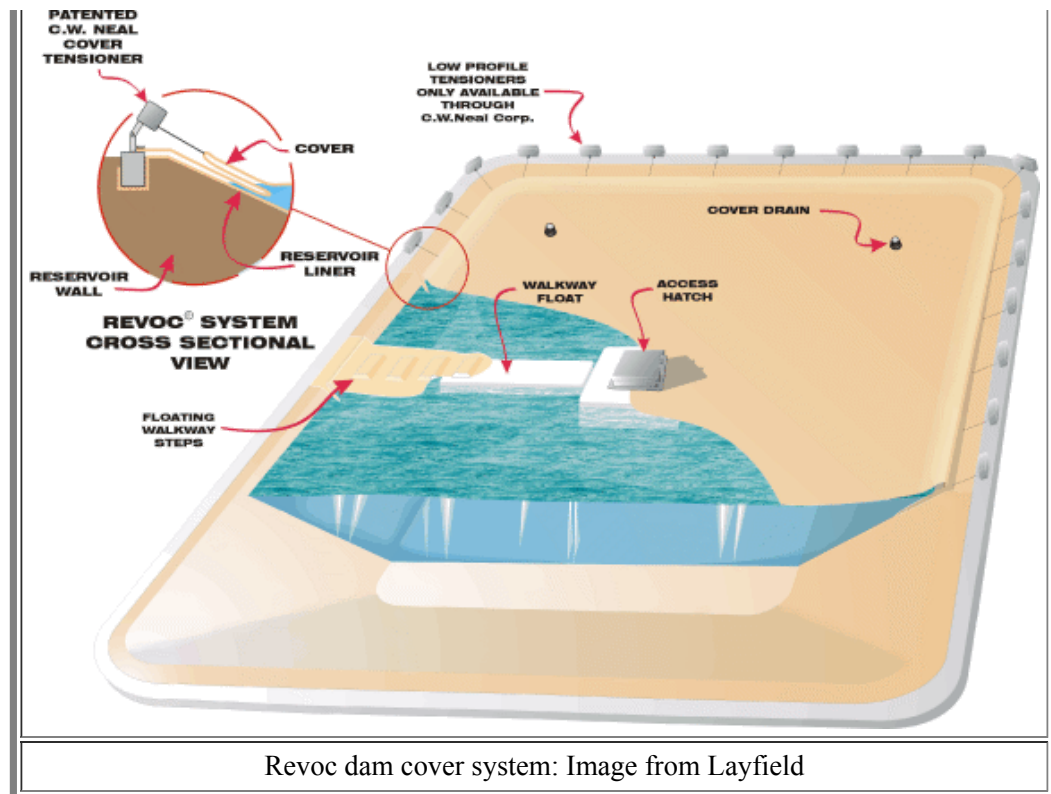
What life would the galvanised steel have in a continually damp situation, especially if significant salinity was involved? A guarentee is not much use if the company behind the product goes broke.

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Revoc

Made by





Revoc dam cover system: Image from Layfield

Layfield/C. W. Neal, this and [Defined Sump](#) have a [page](#) on the Net. Layfield's blurb:

"REVOC Floating covers use patented tensioners attached around the perimeter of the cover system to prevent undue cover movement and wrinkling regardless of the reservoir's water level fluctuation. Tensioners also serve to retain slack cover material in a defined peripheral sump. Cover drains conduct storm water into a drainage system. The floating cover is typically fabricated of reinforced Hypalon or polypropylene geomembranes. Floats and weights are encapsulated in geomembrane for maximum longevity. REVOC floating covers offer lower maintenance and lower replacement cost than other floating cover type."

My thoughts

Installation of the tensioners would cause serious damage of the native vegetation on [my dam](#) wall. The [Desert Knowledge CRC paper](#) gives an estimated cost (Dec. 2004) of \$30/2m to Layfield's other dam cover, [Defined Sump](#), which is too expensive for me. I have no need to keep water and run-off out of my dam – quite the contrary.

WaterSavr

This is a powder that is spread over the surface of the water. It is claimed that evaporation is reduced by "up to 50%". I believe that it needs to be replaced at fairly frequent intervals. Flexible Solutions have a [Net page](#) on WaterSavr.

On 2013/09/03 Dr Chris Fellows, Senior Lecturer in Chemistry, School of Science and Technology, University of New England, Armidale NSW was kind enough to provide the following in regard to WaterSavr:

"It is a substance called hexadecanol mixed with lime to help it spread on the surface. The hexadecanol is innocuous and will degrade quickly (bacteria eat it) – probably even faster than you saw the [Aquatain](#) degrade, I expect [you] would have to apply it

every three or four days. There wouldn't be enough lime in the small amounts used to make much of a difference to the pH of your dam, so there should be no worries at all about soil or water quality. (Products like it have been used in very large scale trials since about 1950 – which is an indication that no one has figured out how to get reproducible results from it yet, or we would be applying it routinely everywhere!)

What will do the job with WatrSavr is an invisible layer only one molecule thick that spreads out from the powder particles, so you don't need to cover your whole dam with powder – any remaining powder on the surface is just an indication that it hasn't all degraded yet. Our work here suggests that besides the degradation problems, it won't have any appreciable effect in still air or high winds, but could be effective at reducing evaporation at wind speeds between about 5 and 15 kph."

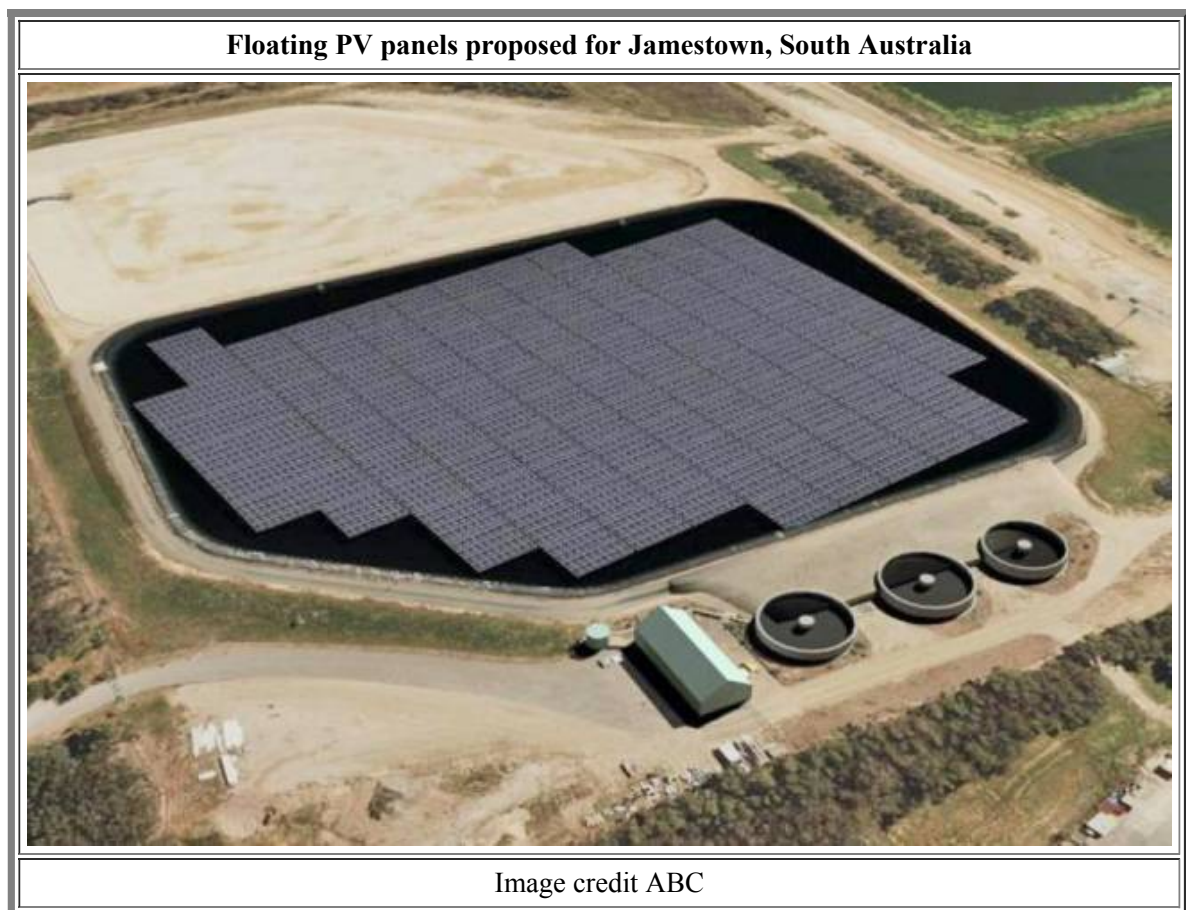
My thoughts

In effect it sounds similar to Aquatain, which I have tried and been disappointed with.

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PV panels

Geits
ANZ
has



proposed a floating solar power plant on common effluent ponds at Jamestown in Mid North South Australia. See an article on [ABC](#) by Matthew Doran.

The proponents say that the water will cool the panels and that this will "prove at least 50 per cent more efficient than a land-based solar power". While cooling the panels certainly does increase their efficiency in converting light into power this claim is an exaggeration. Whether the water is actually in contact with the solar panels is not stated.

Have they considered the fact that by virtually stopping evaporation and by transferring the heat from the panels into the water they will be heating the water? The exposed (warm) water around the sides of the pond will evaporate relatively quickly and cool the whole of the water body to some extent, but of course this will lessen the desired evaporation reduction aim.

While the panels will heat the water during the day, quite a bit of that heat will then radiate away during the night ([Passive cooling by radiation](#)). However it is not possible to have both maximum cooling effect on the panels and maximum reduction in evaporation at the same time.

It is a very innovative and commendable project and should work very well, although perhaps not quite so well as the proponents are claiming.

Other evaporation barriers

There are more products out there for reducing evaporation. I'd be grateful if any reader can tell me anything useful about other system, or those mentioned above, especially if they have had personal experience with them; my email address is at the [top](#) of this page.

Also see [Using waste materials](#).

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Shade cloth

I considered making a shade cloth cover for my dam. It would shade the water and greatly reduce wind velocity over the water; both factors reducing the evaporation rate.

I decided against the idea, having used shade cloth in areas exposed to wind I knew that it could suffer from wear if it was to move at all over any supporting structure, and I decided that the support it would need would be complex and expensive. The cost of the shade cloth itself would also be quite high.

Using waste materials

Selected flotsam picked up from beaches could be useable.

Scrap plastic bottles are available in big numbers, but I suspect they would have a short life if exposed to sunlight; if the bottles themselves didn't deteriorate, the caps might. Also they could blow off the dam's surface, unless they were partly filled with water. South Australia's container deposit would pose an administrative problem here.

Glass

Wine bottles are available in large numbers at no cost from at least some recycling agents.

Unfortunately a very large number of wine bottles (about 60/m², around 42 000 for my dam) and some very cheap way of sealing them would be needed. The time required for collecting and sealing

the bottles would make the project impractical.

Glass objects can be produced cheaply and glass has a very long life in the open and would not cause any pollution of the water in the dam. Could purpose-made glass floats be made at a competitive price? Installing the glass floats without smashing them would pose a technical problem.

Glass and plastic

Glass floats (old bottles?) incorporated into recycled plastic sheets could well be both practical and cheap. The problem of the fragility of glass would be solved because the bottles would be protected by a coating of plastic and the plastic could seal the bottles. The bottles would provide the buoyancy needed to keep the recycled plastic above the water.

Tires

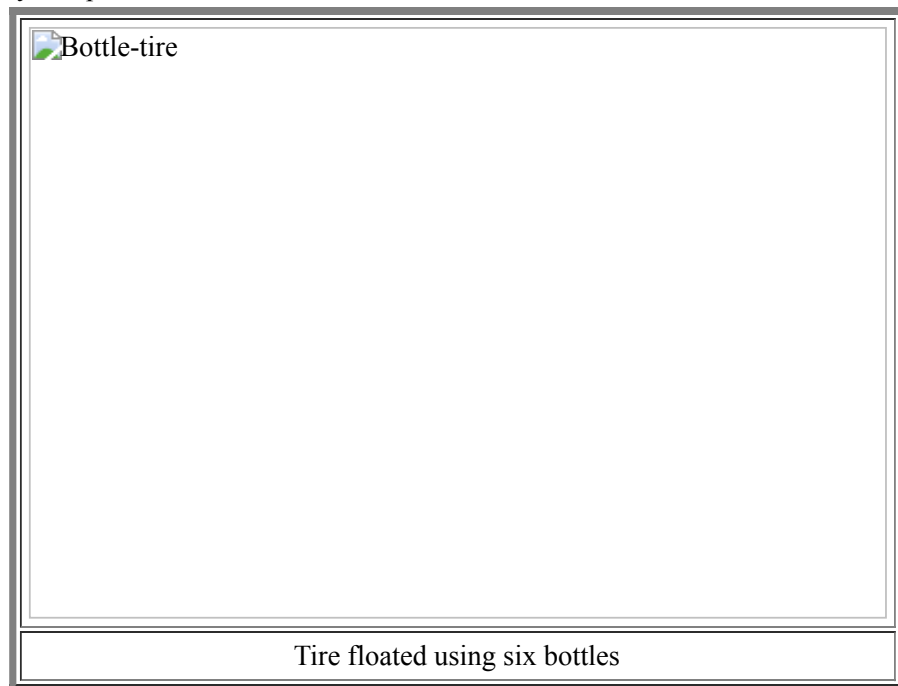
Also see [AgFloats](#).

Perhaps glass (or plastic) bottles could be used to create the necessary buoyancy to float the tires?

The tire on the right is buoyed by six corked wine bottles, it is 62cm in diameter, 0.30m² in area. The bottles fit snugly into the tire and would be

very unlikely to come out. Given approximately three tires per square metre my dam would require about 2100 tires buoyed by 12 600 bottles; still a very large number of bottles.

I used used wine bottle corks for the tire in the photo. An important unknown is the effective life of the corks.



Tractor tires

Old tractor tires are freely available in agricultural areas where there are also many dams. Used 20L pesticide containers are also plentiful. Cleaned 20L containers can be used to make floats (four to a tire) inside the tractor tires; the tires would protect the containers from most sunlight.

Floating wood barrier

Why not float scrap wood on the dam's surface?

Untreated wood will, I believe, become waterlogged, sink, and rot; not only becoming useless, but polluting the water.

I wouldn't use wood treated with copper, chrome arsenate (CCA, the green stuff) because of the risk of the heavy metals leaching into and poisoning the water.

What about wood treated with creosote? The creosote would stop the wood from rotting and might stop it from becoming waterlogged. It would be inadvisable to use water from any dam with creosote floating on it for drinking or for water for animals to drink, but it might be harmless for

irrigation of plants? I'm thinking something like creosote posts pulled out of old vineyards; the creosote would be much more bound to the wood in such old posts than in new ones.

It would be possible for scrap wood to be coated with something to waterproof it, but this doesn't seem to be something the dam owner could practically do. Could wood be protected from waterlogging by encasing it in recycled plastic? It might be a business opportunity.

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Research and links

DKCRC, Water Smart paper

A 7MB pdf file on "Loss of storage water through evaporation with particular reference to arid and semi-arid zone pastoralism in Australia" is available from [Desert Knowledge CRC](#) (CRC – cooperative research centre). This document includes a description of the problem and summarizes types of solutions that have been used, it includes an extensive list of available products, provides a valuable summary of each and is a good starting point for researching the barrier that is right for you. However it does not provide any independent evaluation of products and some of the prices quoted seem at odds with prices I have obtained.

The Cooperative Research Centre for Irrigation Futures has a page on Dam Evaporation Mitigation at <http://www.irrigationfutures.org.au/projects.asp?ID=37>. This is mainly concerned with monolayer barriers.

Other links are within the sections on various products.

What I did

Updated
2016/01/17

I ordered 700m² of [AgFloats](#) for my dam. The first truck load of 740 tires were delivered just before Christmas of 2009, the second in February, and the third on 2010/03/16. (ReClaim were having more trouble than they expected in getting the production system running properly, I believe they were going to do a major rebuild in the cool half of the year after the demand had dropped.)

I have some concern for the stability of the polystyrene because of it being exposed to sun and weather and by May 2010 there was some evidence of birds having broken some of it away from some tires.

I intended to measure their effectiveness in the summer of 2010-11; the results will be written-up on this page. By September 2013 I still hadn't got around to this.



AgFloats (Mark 2) on my dam. The first of several deliveries.



About 2100 AgFloat tires on my dam the day of the third delivery, 16 March 2010.

About 80% of the water was covered at this time, but once the dam refilled there would be much more open water. I might buy more AgFloats later. 247kL had been pumped in the season, I estimate three times that had evaporated. Next year there should be much less evaporation!

Unfortunately I think the company that made AgFloats went out of business a year or so after I installed them.

Unexpected

By 2016 a number of redgum trees had become established in some of the tires. I have written about this on [another page](#) on this site.

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